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UNIVERSAL SERVER FARM MASS CUSTOM DESIGN TOOL

BACKGROUND OF THE INVENTION

5 **1.   Technical Field:**

The present invention relates generally to computer software and, more specifically to designing server configurations.

10 **2.   Description of Related Art:**

The Internet, also referred to as an "internetwork", is a set of computer networks, possibly dissimilar, joined together by means of gateways that handle data transfer and the conversion of messages from a protocol of the
15 sending network to a protocol used by the receiving network. When capitalized, the term "Internet" refers to the collection of networks and gateways that use the TCP/IP suite of protocols.

The Internet has become a cultural fixture as a
20 source of both information and entertainment. Many businesses are creating Internet sites as an integral part of their marketing efforts, informing consumers of the products or services offered by the business or providing other information seeking to engender brand loyalty. Many
25 federal, state, and local government agencies are also employing Internet sites for informational purposes, particularly agencies which must interact with virtually all segments of society such as the Internal Revenue Service and secretaries of state. Providing informational
30 guides and/or searchable databases of online public records may reduce operating costs. Further, the Internet is becoming increasingly popular as a medium for

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commercial transactions.

Currently, the most commonly employed method of transferring data over the Internet is to employ the World Wide Web environment, also called simply "the Web". Other
5   Internet resources exist for transferring information, such as File Transfer Protocol (FTP) and Gopher, but have not achieved the popularity of the Web. In the Web environment, servers and clients effect data transaction using the Hypertext Transfer Protocol (HTTP), a known
10 protocol for handling the transfer of various data files (e.g., text, still graphic images, audio, motion video, etc.). The information in various data files is formatted for presentation to a user by a standard page description language, the Hypertext Markup Language
15 (HTML). In addition to basic presentation formatting, HTML allows developers to specify "links" to other Web resources identified by a Uniform Resource Locator (URL). A URL is a special syntax identifier defining a communications path to specific information. Each logical
20 block of information accessible to a client, called a "page" or a "Web page", is identified by a URL. The URL provides a universal, consistent method for finding and accessing this information, not necessarily for the user, but mostly for the user's Web "browser". A browser is a
25 program capable of submitting a request for information identified by an identifier, such as, for example, a URL. A user may enter a domain name through a graphical user interface (GUI) for the browser to access a source of content. The domain name is automatically converted to
30 the Internet Protocol (IP) address by a domain name system (DNS), which is a service that translates the symbolic name entered by the user into an IP address by looking up

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the domain name in a database.

Many businesses wishing to exploit the web for business purposes must implement a network of servers and other components connected to the web to implement the

5 functionality that propels their businesses. However, since the needs of individual businesses vary, providers of these components and services usually do not provide a "one-size-fits-all" web hosting system, but rather supply customized systems to fit the requirements of each of the

10 customers individually. However, since it is customized to the needs of the individual enterprise, creating a complex schematic drawing showing the necessary resources and connections to supply the needs of the customer as well as satisfying the policy and protocol requirements

15 of the provider can be very difficult and time consuming using existing drawing programs. Such a task is difficult for at least two reasons. First, the policy requirements of a provider for connecting various components together properly and the knowledge of which

20 components are necessary can be very difficult for a layperson. Second, the interface for many, if not most, drawing programs are quite complex to use. Therefore, it would be desirable to have a method for creating schematic diagrams for web hosting hardware that is

25 simple to use and less time consuming to use than prior art methods.

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SUMMARY OF THE INVENTION

The present invention provides a method, system, and
computer program product for producing a drawing of
components and connections needed to implement a desired
system, such as, for example, a server farm for web
hosting. In one embodiment, the computer program product
receives user needs of the user's desired system. The
product then determines the components and connections
needed to implement a system that satisfies the user
needs and which comply with a set of protocols necessary
to ensure that the system performs properly. In one
embodiment, the user's needs are gathered through a
series of graphical user interfaces. The product then
generates drawing program input that provides
instructions for producing a drawing of the system that
satisfies the user's needs. The drawing program may be,
for example, Visio, a product of the Microsoft
Corporation of Redmond, Washington. The drawing program
input is then sent to the drawing program which then
generates a drawing of the desired system.

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BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the
5   invention are set forth in the appended claims. The
invention itself, however, as well as a preferred mode of
use, further objectives and advantages thereof, will best
be understood by reference to the following detailed
description of an illustrative embodiment when read in
10 conjunction with the accompanying drawings, wherein:

Figure 1 depicts a pictorial representation of a
data processing system in which the present invention may
be implemented in accordance with a preferred embodiment
of the present invention;

15 **Figure 2** depicts a block diagram of a data processing
system in which the present invention may be implemented;

Figure 3 depicts a block diagram of a web hosting
customization tool interfaced with a drawing program
according to the present invention;

20 **Figure 4** depicts a pictorial diagram illustrating an
exemplary drawing program graphical user interface;

Figures 5A-5N depict pictorial diagrams illustrating
a series of exemplary graphical user interfaces that may
be used by a user to supply the web hosting customization
25 tool with the information necessary to construct a
technical diagram with a drawing program in accordance
with the present invention;

Figure 6 depicts a process flow and program function
illustrating an exemplary procedure for gathering user
30 information regarding user needs and then creating a
server farm design satisfying an enterprise's needs is
depicted in accordance with the present invention;

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  Figure 7 depicts an example of a drawing illustrating a server farm design produced using the present invention in conjunction with a drawing program; and

5 **Figures 8A-8B** depict an exemplary list of hardware necessary to implement the requirements of a user based on input (not shown) entered by the user into the tool.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures and in particular
5   with reference to **Figure 1**, a pictorial representation of
a data processing system in which the present invention
may be implemented is depicted in accordance with a
preferred embodiment of the present invention.   A
computer **100** is depicted which includes system unit **102**,
10   video display terminal **104**, keyboard **106**, storage devices
108, which may include floppy drives and other types of
permanent and removable storage media, and mouse **110**.
Additional input devices may be included with personal
computer **100**, such as, for example, a joystick, touchpad,
15   touch screen, trackball, microphone, and the like.
Computer **100** can be implemented using any suitable
computer, such as an IBM RS/6000 computer or
IntelliStation computer, which are products of
International Business Machines Corporation, located in
20   Armonk, New York. Although the depicted representation
shows a computer, other embodiments of the present
invention may be implemented in other types of data
processing systems, such as a network computer.   Computer
100 also preferably includes a graphical user interface
25   (GUI) that may be implemented by means of systems
software residing in computer readable media in operation
within computer **100**.

With reference now to **Figure 2**, a block diagram of a
data processing system is shown in which the present
30   invention may be implemented.   Data processing system **200**
is an example of a computer, such as computer **100** in

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Figure 1, in which code or instructions implementing the processes of the present invention may be located. Data processing system **200** employs a peripheral component interconnect (PCI) local bus architecture. Although the
5   depicted example employs a PCI bus, other bus architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used. Processor **202** and main memory **204** are connected to PCI local bus **206** through PCI bridge **208**. PCI bridge **208** also
10 may include an integrated memory controller and cache memory for processor **202**. Additional connections to PCI local bus **206** may be made through direct component interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter **210**, small
15 computer system interface SCSI host bus adapter **212,** and expansion bus interface **214** are connected to PCI local bus **206** by direct component connection. In contrast, audio adapter **216,** graphics adapter **218,** and audio/video adapter **219** are connected to PCI local bus **206** by add-in boards
20 inserted into expansion slots. Expansion bus interface **214** provides a connection for a keyboard and mouse adapter **220,** modem **222,** and additional memory **224.** SCSI host bus adapter **212** provides a connection for hard disk drive **226,** tape drive **228,** and CD-ROM drive **230.** Typical PCI local
25 bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor **202** and is used to coordinate and provide control of various components within data processing system **200** in **Figure 2.** The
30 operating system may be a commercially available operating system such as Windows 2000, which is available from

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Microsoft Corporation. An object oriented programming
system such as Java may run in conjunction with the
operating system and provides calls to the operating
system from Java programs or applications executing on
5   data processing system **200**. "Java" is a trademark of Sun
Microsystems, Inc. Instructions for the operating system,
the object-oriented programming system, and applications
or programs are located on storage devices, such as hard
disk drive **226**, and may be loaded into main memory **204** for
10 execution by processor **202**.

Those of ordinary skill in the art will appreciate
that the hardware in **Figure 2** may vary depending on the
implementation. Other internal hardware or peripheral
devices, such as flash ROM (or equivalent nonvolatile
15 memory) or optical disk drives and the like, may be used
in addition to or in place of the hardware depicted in
Figure 2. Also, the processes of the present invention
may be applied to a multiprocessor data processing
system.

20 For example, data processing system **200**, if
optionally configured as a network computer, may not
include SCSI host bus adapter **212**, hard disk drive **226**,
tape drive **228**, and CD-ROM **230**, as noted by dotted line
232 in **Figure 2** denoting optional inclusion. In that
25 case, the computer, to be properly called a client
computer, must include some type of network communication
interface, such as LAN adapter **210**, modem **222**, or the
like. As another example, data processing system **200** may
be a stand-alone system configured to be bootable without
30 relying on some type of network communication interface,
whether or not data processing system **200** comprises some
type of network communication interface. As a further

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example, data processing system **200** may be a personal digital assistant (PDA), which is configured with ROM and/or flash ROM to provide non-volatile memory for storing operating system files and/or user-generated
5   data.

The depicted example in **Figure 2** and above-described examples are not meant to imply architectural limitations. For example, data processing system **200** also may be a notebook computer or hand held computer in
10 addition to taking the form of a PDA. Data processing system **200** also may be a kiosk or a Web appliance. The processes of the present invention are performed by processor **202** using computer implemented instructions, which may be located in a memory such as, for example,
15 main memory **204,** memory **224,** or in one or more peripheral devices **226-230.**

The present invention provides a method, system, and computer program product for presenting a simple user interface for constructing diagrams of configuring web
20 hosting networks and other networks that must conform to specified guidelines.

With reference now to **Figure 3,** a block diagram of a web hosting customization tool **310** interfaced with a drawing program **302** is depicted according to the present
25 invention. The drawing program **302,** such as, for example, Visio, a product of Microsoft Corporation of Redmond Washington, includes a drawing program input interface **304,** a drawing program output interface **306,** and drawing functions **308.** Drawing functions **308** provide
30 the functionality of the drawing program to produce figures, lines, and pictures. Drawing program output

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interface **306** provides an interface between the drawing
program **302** and an output device, such as, for example, a
video display terminal. The drawing program input
interface **304** provides a mechanism for the drawing
5 program **302** to receive input commands from a user via,
for example, a mouse or keyboard.

However, in the present invention, web hosting
customization tool **310** includes an output interface **312**
configured to interface with drawing program **302** through
10 drawing program's **302** input interface **304**. Web hosting
customization tool **310** in conjunction with drawing
program **302** allows a user to create a schematic layout or
drawing of servers, routers and other equipment and their
connections necessary to implement and host web sites.
15 The drawing produced is sufficient to allow a technician
to connect the various electronic devices in a manner to
implement a web hosting site and provide the capabilities
desired by the user.

Web hosting customization tool **310** allows a user to
20 interact with a simpler interface than that typically
provided by a drawing program **302** that allows a user to
merely specify the requirements that the particular
enterprise needs in order to perform their tasks. This
input is received by Graphical user interface (GUI) **314**.
25 A conversion unit **316** includes rules necessary to
implement a system fulfilling the requirements specified
by the user. For example, in one embodiment, the web
hosting customization tool's **310** GUI **314** encapsulates the
rules comprising IBM's Mass Custom Policy. The
30 conversion unit **316** thus, takes the user input from GUI
314 and converts the input into output that is formatted

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for the drawing program **302**. The output interface **312** then communicates the customization tool's **310** output to the input **304** of drawing program **302**. The drawing program **302** then produces a drawing conforming to the

5   specifications of the user.

With reference now to **Figure 4**, a pictorial diagram illustrating an exemplary drawing program graphical user interface is depicted. Drawing program graphical user interface (GUI) **400** includes a template palette **402**, tool

10   bars **404**, and a drawing display **406**. The tool bar **404** allows the user to open files, select drawing tools, open various template palettes, as well as other features. The template palette **402** contains various figures and pictures that are commonly used, allowing the user to

15   merely drag and drop a picture rather than having to create the image from scratch. The drawings constructed by the user are displayed in drawing display **406**. As can be seen from the picture, constructing complicated drawings using this interface could be quite time

20   consuming and often difficult.

With reference now to **Figures 5A-5N**, pictorial diagrams illustrating a series of exemplary graphical user interfaces that may be used by a user to supply the web hosting customization tool with the information

25   necessary to construct a technical diagram with a drawing program is depicted in accordance with the present invention. In **Figure 5A**, Design type selection GUI **500** allows a user to select the design type, such as whether the user wishes to create a mass custom server farm

30   design or open an existing record of a previously started customization. In **Figure 5B**, customer information GUI

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502 provides a user interface allowing a user to enter customer information such as, for example, company name, address, contact, and phone number. Once the user information has been entered, the user is presented with

5   a geographic load balancing GUI **504** as depicted in **Figure 5C** which allows the user to select whether the user wishes to have the server farm located at a single geographic location or at multiple locations.

The user is then presented with a firewalls GUI **506**
10   as depicted in **Figure 5D**. Firewalls GUI **506** allows a user to provide the design tool with information such as whether the web layer, data layer and backend layer are shared or dedicated, thus enabling the design tool to select the appropriate firewall design to comply with
15   appropriate standards of server farm hosting. In **Figure 5E**, a connectivity GUI **508** allows a user to select the internet bandwidth of the shared and dedicated environments, the backend connectivity and network speeds desired. The design tool then presents the user with a
20   web servers GUI **510** as depicted in **Figure 5F**, that allows the user to select from a plurality of server platforms, platform details, and quantities. Once the server details have been entered by the user, then the design tool presents the user with an application servers GUI
25   **512** as depicted in **Figure 5G**. The application servers GUI **512** allows the user to select the server platform, details, and other information about servers to be used to provide applications to users of the server farm. The user is then finally presented with a database servers
30   GUI **514** as depicted in **Figure 5H** that allows the user to specify information about the servers and quantities desired to be utilized as database servers in the server

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farm.

Once the server information has been selected, the
user is presented with a data backup capacity GUI **516** as
depicted in **Figure 5I**. Data backup capacity GUI **516**
5   provides a user interface allowing the user to select the
data backup requirements needed by the enterprise that
will use the server farm implemented from the server farm
design created by the design tool from the choices
selected by the user. The user is then presented with a
10   load balancers GUI **518** as depicted in **Figure 5J**. The
load balancers GUI **518** allows a user to specify whether a
load balancing product is desired and the location of the
selected load balancer, if one has been selected. The
user then selects the shared environment or dedicated
15   environment template from environment GUI **520** as depicted
in **Figure 5K**. The design templates are drawing package
drawings, such as Microsoft Visio drawings, which
represent and define a base physical and logical network
infrastructure and provide the foundation for the Mass
20   Custom Tool. The templates represent the production
environment in which a design prescribed with the tool
comprises a total solution. The template and the
layering of the selected server and network componentry
architect a solution which can be built and deployed to
25   meet real business requirements.

Once the environment template has been selected, the
user has completed the entering the information that the
design tool needs in order to produce a drawing of the
desired server farm on a drawing program where the
30   drawing provides the details necessary to implement the
system according to the terms of a particular provider of
server farm systems policies and protocols, such as, for

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example, the International Business Machine's Mass Custom
Policy, which is hereby incorporated herein by reference
for all purposes. The user is then presented with a
create document GUI **522** as depicted in **Figure 5L** that

5   allows a user to save the record and to complete the
drawing. The user may then be presented with a budget
and planning estimate **524** as depicted in **Figure 5M** that
provides the user with an estimated cost to implement the
system meeting the requirements specified by the user.

10   Finally, the user will be presented with a create another
GUI **526** as depicted in **Figure 5N** that allows the user to
end the session or to create another server farm design.

The GUI's depicted in **Figures 5A-5N** are provided
merely as examples of GUI's that may be utilized in

15   allowing a user to specify an enterprise's network
computing needs in order that a design of an appropriate
network satisfying these needs and satisfying a
supplier's policies and protocols may be created. The
specific information gathered may vary depending on the

20   policies and protocols of the server farm supplier.

With reference now to **Figure 6**, a process flow and
program function illustrating an exemplary procedure for
gathering user information regarding user needs and then
creating a server farm design satisfying an enterprise's

25   needs is depicted in accordance with the present
invention. To begin, the user starts the design tool,
such as, for example, web hosting customization tool **310**
in **Figure 3**, and logs into the tool (step **601**). The tool
determines whether the user has entered the correct

30   password (step **602**) and if not, prompts the user to log
in again (step **601**). If the user has entered the correct
password, the tool searches for a running copy of a

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drawing program such as, for example, Visio, or starts
the drawing program and then hides the drawing program
(step **603**). A toolbar is then displayed to the user
(step **604**) and the tool awaits the user to select the
5   button to start the information wizard to gather
information necessary to produce a server farm design
(step **605**). An example, of an information wizard is the
series of GUI's presented to a user in one embodiment as
depicted in **Figures 5A-5N**. The tool presents various
10   user interfaces and prompts the user for information
through the wizard (step **607**) thus gathering the
information necessary for the creation of the server farm
design.

Once the user finishes the wizard process (step
15   **608**), the tool begins the drawing process and first
determines whether the user has selected a shared or
dedicated template (step **609**). If the user has selected
a shared environment, then the tool open's the shared
template (step **610**). If the user has selected a
20   dedicated environment, then the tool opens the dedicated
template (step **611**). Once the appropriate template has
been opened, the tool then calculates the space
requirements needed for the design drawing (step **612**).
The tool also adds extra blank pages as needed to allow
25   the design to be completely drawn (step **613**).

Next, the tool creates load balancing hardware and
text for input into drawing program (step **614**). The tool
then creates server hardware and text for input into
drawing program (step **615**) and creates and audit trail
30   text for input to the drawing program (step **616**). The
tool then creates other text for input into drawing

program (step **617**) and appends backend network page for input into drawing program (step **618**). The tool then appends client-safe page with proprietary information removed for input into drawing program (step **619**) and

5   created connection input for the drawing program (step **620**). The connection input data is used to instruct the drawing program how to draw connections for the various servers and other components that are drawn. The tool then sends all of the input to the drawing program (step

10 **621**), which then creates a drawing based on the input received from the tool. The tool then unloads and the drawing program is revealed to display the drawing (step **622**).

An example of a drawing illustrating a server farm

15 design produced using the present invention in conjunction with a drawing program is depicted in **Figure 7**. As can be seen from observing **Figure 7**, diagrams of resources and connections necessary to implement a server farm are complex and detailed. Producing such a figure

20 using a drawing package, such as depicted in **Figure 4**, could be quite time consuming and difficult, especially for persons not familiar and comfortable with a drawing program. However, the present invention eliminates the need for a user to learn how to use a drawing program and

25 also reduces the time to create a diagram such as depicted in **Figure 7** by providing a series of graphical user interfaces that allow a user to quickly select the requirements desired and then using policy and protocol requirements for a supplier's products to determine the

30 products and connections needed to implement the user's desires. A set of inputs for a drawing program are then created by the tool based on the user's needs and the

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supplier's protocols to supply to a drawing program. The
drawing program then creates a drawing illustrating the
components and connections necessary to satisfy the
user's needs. Thus, the present invention reduces the
5   time and simplifies the knowledge required to produce a
solution diagram for a server farm or web hosting site
for e-business enterprises.

Figures 8A-8B depict an exemplary list of hardware
necessary to implement the requirements of a user based
10   on input (not shown) entered by the user into the tool.
It is important to note that while the present invention
has been described in the context of a fully functioning
data processing system, those of ordinary skill in the
art will appreciate that the processes of the present
15   invention are capable of being distributed in the form of
a computer readable medium of instructions and a variety
of forms and that the present invention applies equally
regardless of the particular type of signal bearing media
actually used to carry out the distribution. Examples of
20   computer readable media include recordable-type media,
such as a floppy disk, a hard disk drive, a RAM, CD-ROMs,
DVD-ROMs, and transmission-type media, such as digital
and analog communications links, wired or wireless
communications links using transmission forms, such as,
25   for example, radio frequency and light wave
transmissions. The computer readable media may take the
form of coded formats that are decoded for actual use in
a particular data processing system.

The description of the present invention has been
30   presented for purposes of illustration and description,
and is not intended to be exhaustive or limited to the
invention in the form disclosed. Many modifications and

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variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of

5 ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.